

## Wastewater Treatment (WAC 463-42-195)

### **WAC 463-42-195 PROPOSAL — WASTEWATER TREATMENT.**

*The applicant shall describe each wastewater source associated with the facility and for each source, the applicability of all known, available, and reasonable methods of wastewater control and treatment to ensure it meets current waste discharge and water quality regulations. Where wastewater control involves collection and retention for recycling and/or resource recovery, the applicant shall show in detail the methods selected, including at least the following information: Waste source(s), average and maximum daily amounts and composition of wastes, storage capacity and duration, and any bypass or overflow facilities to the wastewater treatment system(s) or the receiving waters. Where wastewaters are discharged into receiving waters, the applicant shall provide a detailed description of the proposed treatment system(s), including appropriate flow diagrams and tables showing the sources of all tributary waste streams, their average and maximum daily amounts and composition, individual treatment units and their design criteria, major piping (including all bypasses), and average and maximum daily amounts and composition of effluent(s). [Statutory Authority: RCW 80.50.040(1) and chapter 80.50 RCW. 81-21-006 (Order 81-5), §463-42-195, filed 10/8/81. Formerly WAC 463-42-470.]*

## **2.8 WASTEWATER TREATMENT (WAC 463-42-195)**

This section provides information on the proposed process wastewater discharge streams and alternative systems in the following subsections:

- Process Wastewater Streams (Subsection 2.8.1)
- Wastewater Analyses (Subsection 2.8.2)
- Regulatory Compliance (Subsection 2.8.3)
- Bypass and Overflow Facilities (Subsection 2.8.4)
- Alternative Methods (Subsection 2.8.5)

### **2.8.1 PROCESS WASTEWATER STREAMS**

The Satsop CT Project has been designed to minimize wastewater discharges, with only a single waste stream to be discharged from each phase. The design for each phase includes waste streams that will be treated as necessary and co-mingled prior to discharge. These waste streams consist of cooling tower blowdown and oil/water-separator decant. The co-mingled waste streams from each phase will be discharged to the Satsop Development Park's blowdown line in accordance with the NPDES permit (Permit No. WA-002496-1; see Section 2.8.2) for the Satsop CT Project. As shown on Figure 2.8-1, the outfall discharges to the Chehalis River. Figures 2.8-2, 2.8-3, and 2.8-4 illustrate maximum, minimum, and average daily composition of waste streams.

#### **2.8.1.1 Water Treatment System Units and Discharge**

##### **Cooling Tower Blowdown**

The cooling towers will continuously receive the heated cooling water from the plants. Heated water will enter the tower near the top and will be sprayed downward through each tower. Evaporation in the cooling towers will result in a loss of cooling water, and the constituents of the cooling water will be concentrated due to evaporation. At high concentrations, some of these constituents could cause scaling in the heat exchanger surfaces. Therefore, after cooling water has repeatedly circulated through the cooling cycle, a small portion will be removed from each cooling tower basin and discharged in accordance with the NPDES permit. (This discharge is termed cooling tower “blowdown”.)

Since the cooling water will be repeatedly circulated before being discharged, several of the constituents of the cooling water will be concentrated to a point that could result in corrosion. Therefore, an alkaline phosphate treatment is necessary. Chemicals proposed for use in the cooling tower include an acrylic polymer (dispersant), tolyltriazole (copper corrosion inhibitor), phosphonocarboxylate (iron corrosion inhibitor), phosphonate (iron corrosion inhibitor), and sulfuric acid (alkalinity control). Because the circulating water is exposed to atmospheric microbiological contaminants, sodium hypochlorite will be used as a biocide to minimize

microbiological growth. During treatment with sodium hypochlorite, the blowdown discharge valve will remain closed to prevent the release of chlorine. The majority of chlorine will dissipate from the cooling tower basin while the blowdown valve is closed. The retained wastewater will be sampled and analyzed prior to discharge as blowdown. If chlorine is detectable, sodium bisulfite will be added to dechlorinate the residual chlorine. As a result, chlorine will be at or below the detection level. However, if the Certificate Holder can demonstrate to EFSEC that the facility can not operate without a residual discharge, the monthly average free available residual chlorine may be 0.2 mg/l and the daily maximum may be 0.5 mg/l (see NPDES permit).

The types of chemicals used for treatment are listed in Table 2.8-1. The constituents of these chemicals used for treatment of the cooling tower water system are not on the list of toxic substances regulated under WAC 173-201A-040 (Water Quality Standards for Surface Waters in Washington State). The chemicals used for treatment of the cooling water will either be precipitated out of the effluent stream or will be at undetectable concentrations.

**TABLE 2.8-1  
CHEMICALS USED IN COOLING WATER SYSTEM**

<b>Chemical</b>	<b>Description and Use</b>
Scale inhibitor	Liquid phosphate-based corrosion inhibitor used in circulating water treatment system
Sodium hypochlorite	Liquid water treatment chemical for the cooling tower
Hydrochloric acid	Liquid water treatment chemical
Oxygen scavenger	Liquid water treatment chemical

The cooling tower blowdown water from each phase will be co-mingled with the waste stream from each phase's oil-water separator and discharged to the blowdown line to the Chehalis River. The expected flow will be a maximum of 640 gpm for each phase.

Discharges through the blowdown line and outflow structure are regulated by the NPDES permit, which will be amended to include Phase II. As described below (Subsection 2.8.2), the cooling tower discharge will meet the limitations of the NPDES permit and will be in compliance with applicable state water quality criteria (WAC 173-201A). The temperature of the discharge will be below the 18°C specified in the NPDES permit, using either heat exchangers and/or quench water.

### **Oil-Water Separator**

The oil-water separator will be designed to produce an effluent concentration of less than or equal to 15 ppm of oil.

The oil-water separator will be provided for waste streams that potentially may contain oily water such as the steam turbine oil purification system and floor and equipment drains. The oil-water separator will receive and separate water and oil mixtures. Water from the separator will be co-

mingled with the cooling tower blowdown prior to discharge to the Satsop Development Park's blowdown line, while the oil is retained for eventual removal and disposal. The oil-water separator will be a prefabricated modular fiberglass reinforced plastic, cast-in-place concrete structure, or a packaged steel tank type system. The discharge piping will be designed with a leg extending below the maximum design oil depth, which will allow only oil-free water to be discharged. A reservoir included with the oil/water separator will collect the waste oil for off-site recycling or disposal by a licensed contractor.

Large tanks containing oil will be diked and valved to “retain-in-place” any large oil spills for mitigation and cleanup in place.

### **Sanitary Wastes**

Sanitary wastes will be treated at on-site septic tank systems constructed and operated in accordance with the applicable state and Grays Harbor County codes.

#### **2.8.1.2 Internal Waste Streams**

##### **HRSG Blowdown (Internal Stream)**

A small stream (90 gpm) from the HRSG of each phase will be drained to remove the constituents of the make-up water that become more concentrated due to evaporative losses during operation (steam production). This “blowdown” from the HRSG will be routed to a blowdown tank before being piped to the cooling tower for use as make-up water. The purpose of the tank is to absorb the “flashing” (the rapid and forceful decrease in temperature and pressure during blowdown release) as blowdown water is released from the boiler.

##### **Regeneration Waste (Internal Stream)**

Approximately 8 gpm of regeneration waste will be discharged from the boiler feed water treatment system to the cooling tower basin.

##### **Plant Sump Discharge (Internal Stream)**

Each plant sump will receive minor wastewater streams from the steam turbine oil purification system, the transformer containment structure drains, and the generator building floor drains. Wastewater in the plant sump will be routed to an oil-water separator.

## **2.8.2 WASTEWATER ANALYSES**

Wastewater modeling and analyses were conducted to determine the expected concentration of constituents of the discharge from the Satsop CT Phase I Project and to evaluate potential impacts to the receiving water (Chehalis River) from the process water discharge. Discharges to the river were evaluated in comparison to the water quality criteria specified in WAC 173-201A (Water

Quality Standards for Surface Waters of the State of Washington). Phase II discharge will be identical.

Two approaches were used to evaluate impacts to the river. The first approach used a simple mixing equation applied to 25 percent of the flow rate, assuming a low flow in the Chehalis River (550 cfs) and a 7-day, 10-year low flow of 416 cfs. This flow rate includes the low flow from the Satsop River Station at Satsop and the Chehalis River Station at Porter to estimate low flows in the vicinity of the outfall which is downstream of the confluence of the two rivers. The results of these calculations, along with discharge characteristics, are presented in Table 2.8-2.

**TABLE 2.8-2  
WATER QUALITY STANDARDS AND ANALYSES**

Parameters	WAC 173-201A Standards <sup>(a)</sup>		NPDES <sup>(b)</sup> Permit	Influent Concentration (Ranney Wells) (mg/L)	Chehalis River Concentration <sup>(c)</sup> 550 cfs (mg/L)	CT Project Discharge Concentration <sup>(d)</sup> (mg/L)	Receiving Water Concentration		Plume Analysis Results (mg/L)
	Acute Criteria (mg/L)	Chronic Criteria (mg/L)					Minimum Flow Concentration <sup>(e)</sup> (mg/L)	Low Flow Concentration <sup>(f)</sup> (mg/L)	
Arsenic	0.36	0.19	NA	0.0025 <sup>(g,h)</sup>	0.0005 <sup>(g)</sup>	0.016	0.00066	0.00071	0.001751
Cadmium	0.00084	0.00037	NA	0.00005 <sup>(g,i)</sup>	0.00005 <sup>(g)</sup>	0.00032	0.00005	0.00005	3.5E-05
Chromium <sup>+3</sup>	0.63	0.075	0.1 <sup>(j)</sup>	0.0005 <sup>(i)</sup>	0.0006	0.00635	0.00066	0.00068	0.000695
Copper	0.00476	0.00354	0.03	0.0005 <sup>(g,i)</sup>	0.0005	0.00635	0.00056	0.00058	0.000695
Iron	NA	NA	1	0.008 <sup>(i)</sup>	0.107	0.1016	0.10694	0.10693	0.011121
Mercury	0.0024	0.000012	NA	0.0001 <sup>(g,i)</sup>	0.0004	0.00064	0.00040	0.00040	7.01E-05
Nickel	0.473	0.052	0.065	0.0005 <sup>(g,i)</sup>	0.0005 <sup>(g)</sup>	0.00635	0.00056	0.00058	0.000695
Lead	0.0116	0.00045	NA	0.00005 <sup>(g,i)</sup>	0.0005 <sup>(g)</sup>	0.00032	0.00050	0.00050	3.5E-05
Selenium	0.02	0.005	NA	0.001 <sup>(g,i)</sup>	0.001 <sup>(g)</sup>	0.0064	0.00106	0.00107	0.000701
Temperature (°F)	NA	64.4	68	51 <sup>(i)</sup>	52.3	68 <sup>(k)</sup>	52.5	52.5	NA
Zinc	0.0365	0.0331	0.0025	0.0025 <sup>(g,i)</sup>	0.0025 <sup>(g)</sup>	0.03175	0.00280	0.00290	0.003475

(a) Acute: In general, refers to a 1-hour average concentration not to be exceeded more than once every three years on the average.

Chronic: In general, refers to a 4-hour average concentration not to be exceeded more than once every three years on the average.

(b) NPDES permit (effluent limitations, recalculating cooling water blowdown).

(c) Chehalis River at intake area (Envirosphere, 1982)

(d) For constituents stipulated in the NPDES permit only, CT Project discharge concentration - assume 12.7 increase at point of discharge into blowdown line. CT Project discharge of 1.43 cfs (640 gpm) based on preliminary water balance assumptions.

For constituents not stipulated in the NPDES permit, a concentration factor of 6.4 was used.

(e) Receiving water minimum flow rate is the minimum base flow rate specified by WAC 173-522-020 in Chehalis River at Satsop

$$\text{Receiving water concentration} = \frac{(\text{CT Project Discharge} \times 1.43 \text{ cfs}) + (\text{river concentration} \times 550/4 \text{ cfs})}{1.43 \text{ cfs} + 550/4 \text{ cfs}}$$

(f) Receiving water low flow rate is the combined 7-day 10-year low flow in Chehalis River at Porter and Satsop River at Satsop (416 cfs).

$$\text{Receiving water concentration} = \frac{(\text{CT Project Discharge} \times 1.43 \text{ cfs}) + (\text{river concentration} \times 416/4 \text{ cfs})}{1.43 \text{ cfs} + 416/4 \text{ cfs}}$$

(g) -Based on estimated values calculated to equal 1/2 non-detectable analytical limit.

(h) -Ranney Well water data (Supply System).

(i) -Well APW (5 Nov, 1980 - 29 Oct 1981) mean annual dissolved concentration (all ND = 1/2 detection limit)(Envirosphere, 1982)

(j) -NPDES permit limitation for chromium.

(k) -The temperature at the point of discharge will be maintained at or below 18°C (68°F) by the addition of quench water, as required by the existing NPDES permit which states the following:

“The discharge temperature shall be such that the applicable Water Quality Standards for temperature shall be complied with at the edge of the dilution zone. Temperature shall not exceed 18.0 degrees Centigrade. The temperature increases shall not, at any time, exceed  $t=28/(T+7)$ , as described in WAC 173-201A-030 for Class A waters. For purposes hereof, “t” represents the maximum permissible temperature increase measured at a mixing zone boundary and “T” represents the background temperature as measured at a point unaffected by the discharge and representative of the highest water temperature in the vicinity of the discharge. When natural conditions exceed 18.0 degrees Centigrade, no temperature increase will be allowed which will raise the receiving water temperature by greater than 0.3 degrees Centigrade.”

The second approach applied a plume model to the discharge using the existing diffuser designed for the Washington Public Power Supply System (WPPSS) WNP-3 facility. This approach enabled evaluation of mixing and resultant concentrations of water quality parameters of concern (identified in the initial approach) within a specified mixing zone.

The following subsections present the methods used in the mixing analysis (Subsection 2.8.2.1) and the methods used in the plume model analysis (Subsection 2.8.2.2).

#### 2.8.2.1 Mixing Equation Analysis

Concentrations of selected water quality parameters which would occur after mixing the discharge water with Chehalis River water were calculated. Constituents of the influent process water (concentrations of chemical constituents of Ranney well water), receiving water concentrations (Chehalis River water concentrations), discharge concentrations (concentrations in process water to be discharged from the plants), and resultant water quality concentrations are presented in Table 2.8-2. Water quality data are provided in Appendix B.

Table 2.8-2 also presents acute and chronic criteria for toxic substances introduced above background levels into state waters (WAC 173-201A, Water Quality Standards for Surface Waters of the State of Washington). Assumptions made to calculate acute and chronic concentrations were as follows: (1) a river water hardness concentration of 29 mg/l, (2) a temperature of 11.3°C, and (3) a pH level of 7.0, which are average annual levels for these parameters measured weekly by EnviroSphere (1982) at the Chehalis River “intake” area. If natural levels of a toxic compound in the receiving stream exceed the criteria, the natural level serves as the standard.

Water quality data for Well APW (part of the Ranney well collector system) were assumed to represent influent water quality. Metal constituents and other water quality parameters were measured weekly by EnviroSphere (1982) in Well APW. The metals concentrations used for the analysis were the dissolved fraction. Total metal concentrations include the desiment fraction which would be expected to be insignificant as the Ranney well gravel pack is developed by pumping, and sediment is removed due to settling in the cooling tower basin. For chemical constituents not measured in Well APW, the analytical data from Ranney well sampling conducted by the Supply System were used. Concentrations of selected constituents in the receiving water (Chehalis River) were assumed to be those concentrations measured at the “intake” area in the Chehalis River (EnviroSphere 1982).

Dividing maximum process influent flow by outflow and assuming no loss of naturally occurring chemical constituents through scaling or other means, the naturally occurring chemical constituent concentration of the outflow was estimated to be approximately 6.4 times greater than that of the inflow.

To calculate the concentration factor for the discharge from Phase II to the blowdown line, the cycles of operation, or concentration factor (6.25) in the cooling tower is added to the concentration factor of the naturally occurring chemical constituent concentration.

The 6.4 concentration factor was used in the analysis to estimate the resultant concentrations of regulated inorganic constituents (including trace metals) discharged to the river. The 12.7 factor was used to estimate constituent concentrations regulated by the NPDES permit at the point of discharge to the blowdown line. As required by WAC 173-201A-100, the mixing analysis assumed the flowrate in the receiving water was 25 percent of the 550 cfs (247,000 gpm) minimum permitted flow in the Chehalis River. Similarly, receiving water concentrations during a low-flow event in the Chehalis River were estimated using 25 percent of the 7-day, 10-year low flow rate of 416 cfs (187,000 gpm) in the Chehalis River below the confluence of the Satsop River, where the existing discharge is located. This mixing analysis did not consider dimensions of the mixing zone.

Resultant constituent concentrations in the Chehalis River (at the point of discharge) after mixing with effluent from the project were calculated using the mixing equation below:

$$[C] = \frac{[C_R] \times Q_R + [C_D] \times Q_D}{Q_R + Q_D} \quad (1)$$

where,

C = resultant concentration in the river after mixing

C<sub>R</sub> = concentration in receiving water (river)

C<sub>D</sub> = concentration in discharge

Q<sub>R</sub> = flow in receiving water

Q<sub>D</sub> = flow in discharge

Values for each variable are presented in Table 2.8-2.

#### 2.8.2.2 Plume Model Analysis

A plume model was used to evaluate the efficiency of mixing and dilution within a specified mixing zone. This model used the diffuser dimensions of the existing outfall structure and river data previously described.

Water discharged from the project is estimated to contribute 426 to 640 gpm per phase to the Chehalis River. Average annual flow in the Chehalis River at a point 2.2 miles downstream of its confluence with the Satsop River was 5,109 cfs (2,293,000 gpm) from 1980 to 1982. The anticipated discharge amount for the project will add minimally to the streamflow quantity in the Chehalis River and will not measurably affect average streamflow rates. During low flow periods, streamflow in the Chehalis River may be minimally supplemented by discharge from the project. Mean low flows in the Chehalis River downstream of the Satsop River for 1-, 7-, 30-, 60-, and 90-day return periods range from 538 to 805 cfs (241,500 gpm to 361,300 gpm). Maximum estimated discharge from Phase II will increase low flows in the Chehalis River by approximately 0.27 percent.

The existing diffuser at the outfall in the Chehalis River (see Figure 3.3-1 for the proposed discharge location) consists of a 30-foot diffusion manifold with 46, 2-inch ports on risers spaced every 8 inches. As designed, the ports discharge horizontally, approximately 12 inches from the bottom of the river and approximately 6 feet below Mean Higher High Water (MHHW). An estimate was made of the dispersion capabilities of this diffuser arrangement by modeling the turbulent mixing capability of the Chehalis River at the location of the diffuser. This type of analysis is preferable to the more commonly used plume modeling method because of the relatively shallow depth of the diffuser. In this case, the turbulent characteristics of the river dominate the mixing process.

Using a transverse mixing coefficient developed by Fischer (1979), the dilution factor was estimated at a point 100 feet downstream of the diffuser. This location represents the regulatory limits for the mixing zone as defined in the existing NPDES permit. The regulation also requires that the dilution meet the regulated standard at a point not to exceed 25 percent of the river width transversely. The dilution calculation depended on certain assumptions concerning the river morphology in this area. Specifically, it was assumed that the depth, average velocity, bottom slope, and width of the river were constant over the 100-foot zone. In addition, it was assumed that the diffuser acted as a point source. These assumptions are conservative in nature due to the added turbulence typical of changing river morphology and the dispersed discharge of the existing diffuser. Both of these characteristics tend to increase mixing potential.

### **2.8.3 REGULATORY COMPLIANCE**

As shown in Table 2.8-2, at the point of Phase II's discharge, the dissolved chemical constituents listed in the NPDES permit are below the concentrations in the permit. In addition to the chemical concentrations presented in Table 2.8-2, the NPDES permit specifies effluent limitations on total residual halogens, pH, and flow rate. Water quality data are not available on total residual halogens in the Ranney wells; therefore, it is not possible to predict concentrations in the Phase II discharge water. However, the facility will be operated to meet limitations on residual chlorine levels in the NPDES permit.

Influent pH measured in the Ranney wells (Well APW) ranged from 6.6 to 7.5 (Envirosphere 1982), which is within the NPDES permit limitation (6.5 to 8.5). Concentration effects on pH in the process water are not predictable. However, changes are not likely to be major, and if minor changes are encountered a buffer will be added to remain within the compliance range.

The process water discharge temperature will be maintained at 18°C or lower at the point of discharge to the river. The temperature of the project discharge to the river will be in compliance with the limitations of the NPDES permit, the Site Certification Agreement, and the requirements of WAC 173-201A.

The NPDES permit does not specify limits for many elements that are present in the Ranney well water and which will be concentrated due to evaporation during operation of the Satsop CT Project. All constituents not specified in the NPDES permit must be compared to the state's acute and



chronic criteria levels. However, the NPDES permit allows a dilution zone for effluent constituents of toxic compounds specified in WAC 173-201 but not specified in the permit.

Discharges from the project will be below the state acute toxicity criteria at the point of discharge to the 001 blowdown pipeline, and therefore, will not exceed the state acute criteria in the river. These conclusions hold even if the constituents are concentrated by a factor of 10 (rather than 6.4), indicating that the proposed operating scenario for discharge includes flexibility to meet acute toxicity requirements at the point of discharge.

The results of the plume model analysis indicate that under the worst conditions for mixing, a dilution factor of 50-fold for the effluent concentrations is reached 100 feet downstream from the diffuser. This analysis was based on assumed values for river depth and velocity at the point of discharge and the permitted mixing distance. The depth and velocity estimates have not been field-verified but are within the range typical for low-flow conditions in the portion of the river receiving the discharge.

The concentrations of effluent constituents after transverse mixing are also presented in Table 2.8-2. The plume model results indicate that trace metals concentrated by evaporative losses during the cooling process, and then discharged, will be adequately diluted within the mixing zone. This is evidenced by the fact that the dilution factor is larger than the concentrating factor.

In conducting the comparison of project discharges to the state's chronic water quality criteria, existing data for the Chehalis River were used as described in Section 3.3 – Water, WAC 463-42-322. Reported concentrations of trace metals in the Chehalis River (receiving water) are listed as non-detectable, and were therefore assumed to be half of the lowest potential detection value. Using this assumption, concentrations of two toxic constituents in the river, mercury and lead, are above the applicable chronic criteria during periods of minimum and low flow conditions in the river. However, the Department of Ecology (Paul Pickett, personal communication, 1994) indicated that the sampling and analysis methods used for the Chehalis River data are in some cases questionable and that reported background concentrations of metals in the Chehalis River may not be accurate.

The plume model analysis of concentrations of mercury and lead in the effluent indicates that the concentrations of these constituents will be essentially the same or lower than the reported background concentrations in the Chehalis River. As noted above, the background levels in the river are above chronic toxicity levels, and since the discharge from Phase II will not alter the concentrations of these constituents in the river, the discharge of Phase II will not affect toxicity in the river.

The results also indicate that the diffuser and mixing conditions in the river, within the NPDES specified mixing zone, will be adequate to dilute regulated water quality parameters in the Phase II discharge such that all Class A water quality criteria for toxic substances will be met.

## **2.8.4 BYPASS AND OVERFLOW FACILITIES**

Bypass facilities for wastewater would be limited to use in emergencies only. If a major fire were to occur, the capacities of floor and equipment drains would be greatly exceeded by water used to extinguish the fire, and the oil-water separator would likely overflow. Therefore, plant design includes a bypass around the oil-water separator to avoid overflow. This bypass will direct flows to a containment area specifically designed for each plant site and sized for a 30-minute event. The location of this facility will be shown in the final site plan.

No other bypass facilities would be included in plant design. All tanks would be equipped with overflow drains to prevent catastrophic losses. The discharge from overflow drains would be directed to a containment basin around each tank; each containment basin would be designed to hold 110 percent of the contents of the tank. The containment basin would be used to retain the collected fluids until a manual valve in the discharge piping is opened. Discharge from chemical tank containment basins would be routed to the neutralization tank for treatment; discharge from the fuel tank containment basin in each plant would be collected and disposed of off-site or routed to the oil-water separator for treatment. Administrative procedures require inspection of containment basin contents before opening the manual valve to discharge contents into the wastewater treatment system.

## **2.8.5 ALTERNATIVE METHODS**

The infrastructure and permit for discharge into the Chehalis River already exist, are to be used for Phase I and, thus provide the most cost-effective and efficient approach to wastewater treatment for Phase II.

Zero discharge is another alternative approach. Zero discharge systems recycle and evaporate the water portion of wastewater and concentrate the solids for eventual off-site disposal. In this process, no wastewater is discharged. The zero discharge system was rejected for the following reasons: (1) no water would be returned to the river to supplement flows, and (2) the high cost of installing a zero discharge system.

The approach selected for the Phase II project minimizes plant wastewater discharges by recycling internal wastewater streams as make-up water for the cooling towers. However, some wastewater (up to 3.1 cfs for the entire Satsop CT Project) would be discharged to the Chehalis River, returning a portion of the water pumped from the Ranney wells (which obtain 88 percent of their water from the river). This is considered a beneficial condition since the wastewater returned to the river meets both NPDES permit criteria and state water quality standards.

Use of a deep well injection system represents another alternative method of wastewater handling. However, this approach is rarely used in power generation facilities. Deep well injection systems are dependent on the nature of the site's underlying aquifer, and are typically very difficult to permit. In addition, the water would not be recharged to the aquifer from which it is extracted. Due

to the many risks associated with deep well injection, this alternative was not considered for the Phase II project.

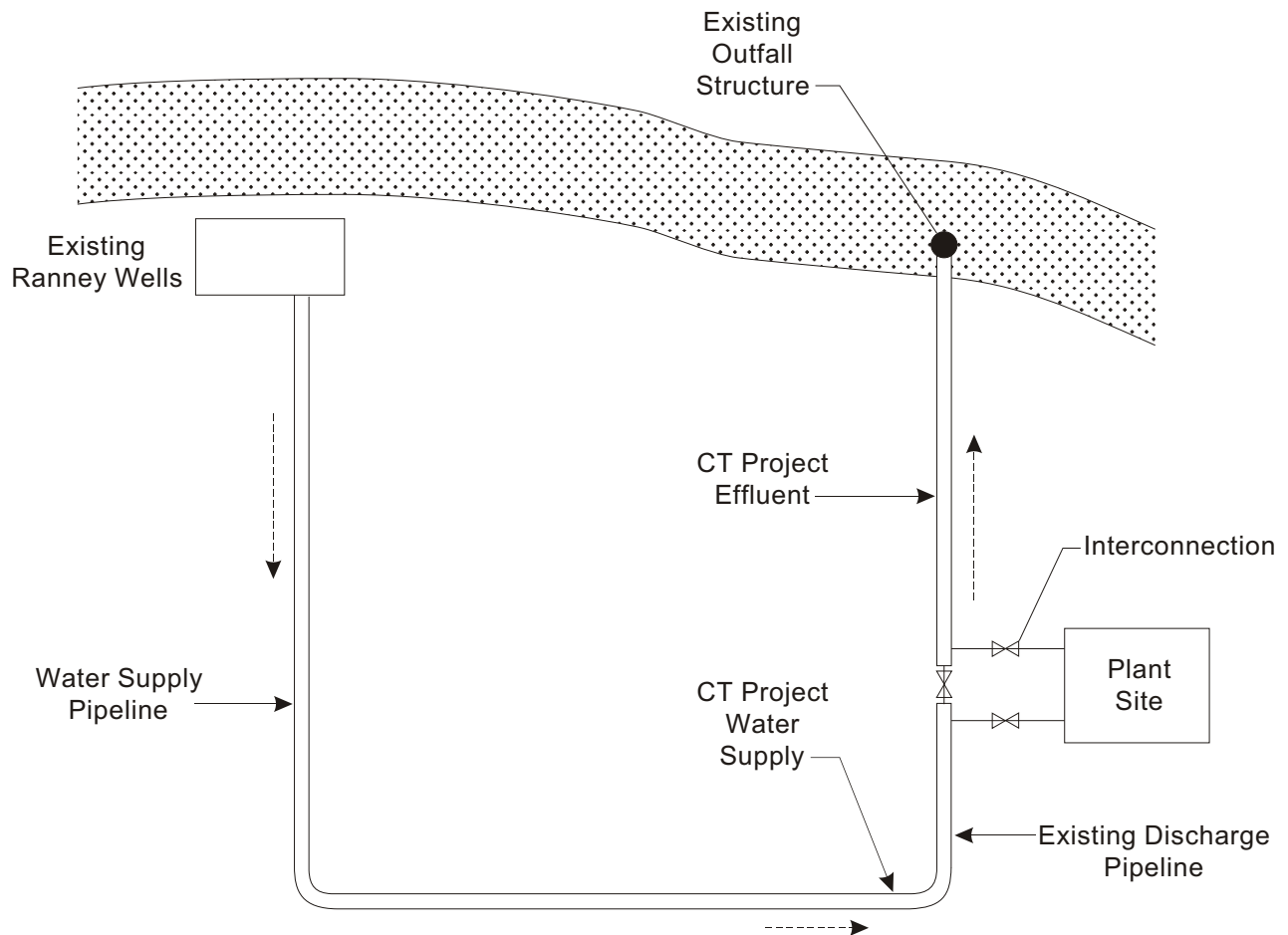
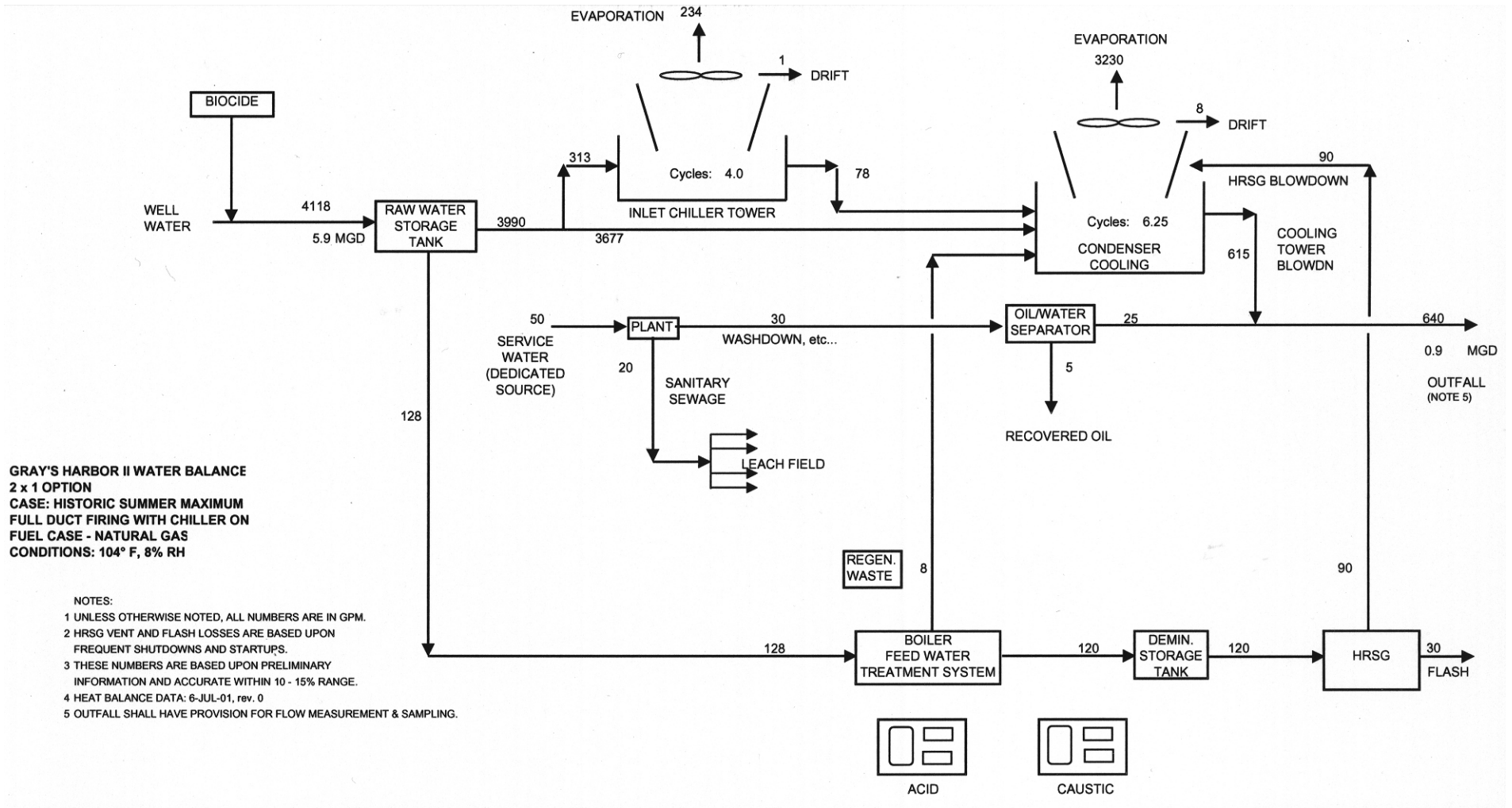
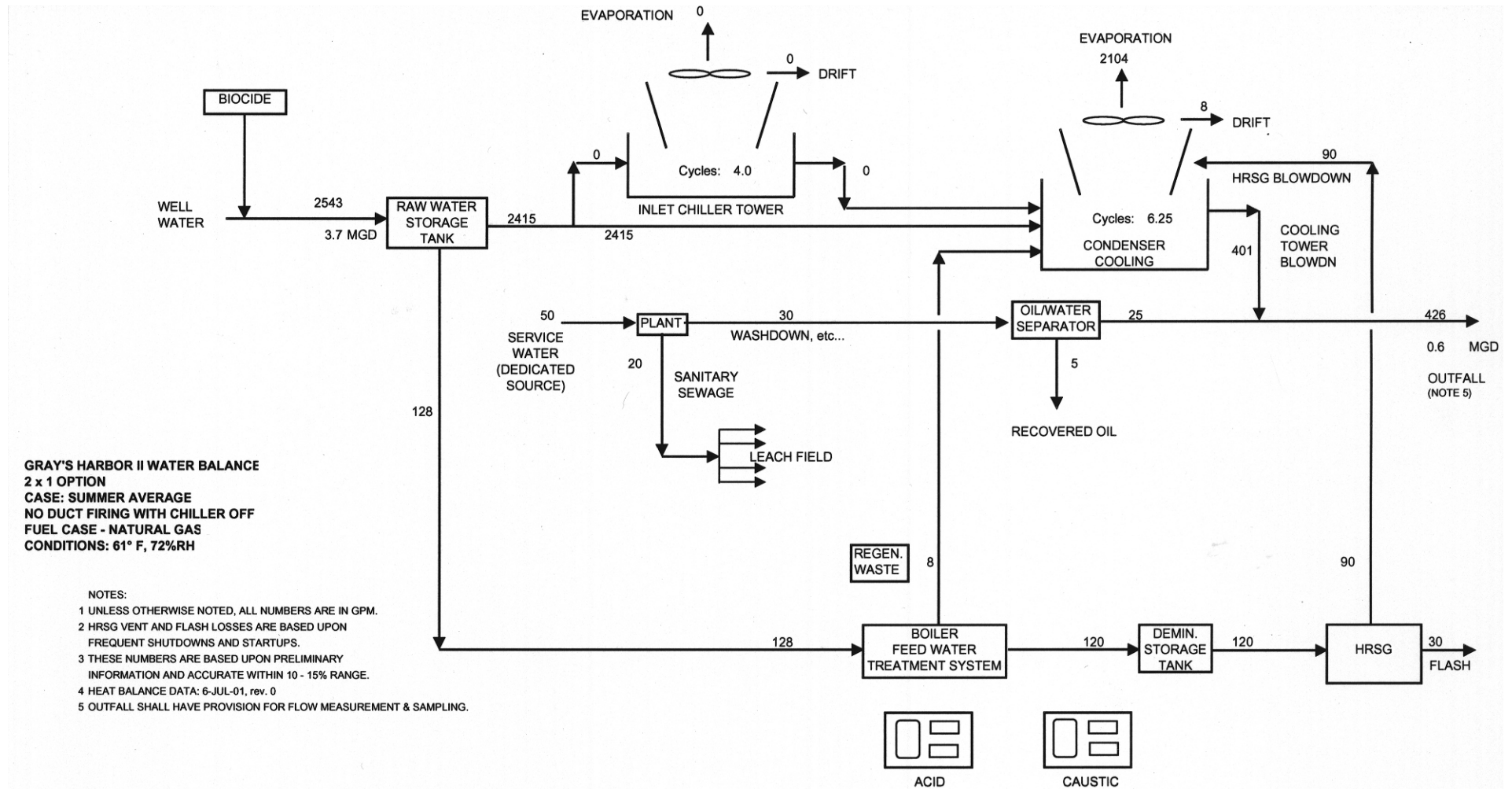


Figure 2.8-1  
**Process Water  
Conceptual Flow Diagram**



Source: Duke/Fluor Daniel

Figure 2.8-2  
**Process Water Maximum**



Source: Duke/Fluor Daniel

Figure 2.8-3  
**Process Water Maximum**



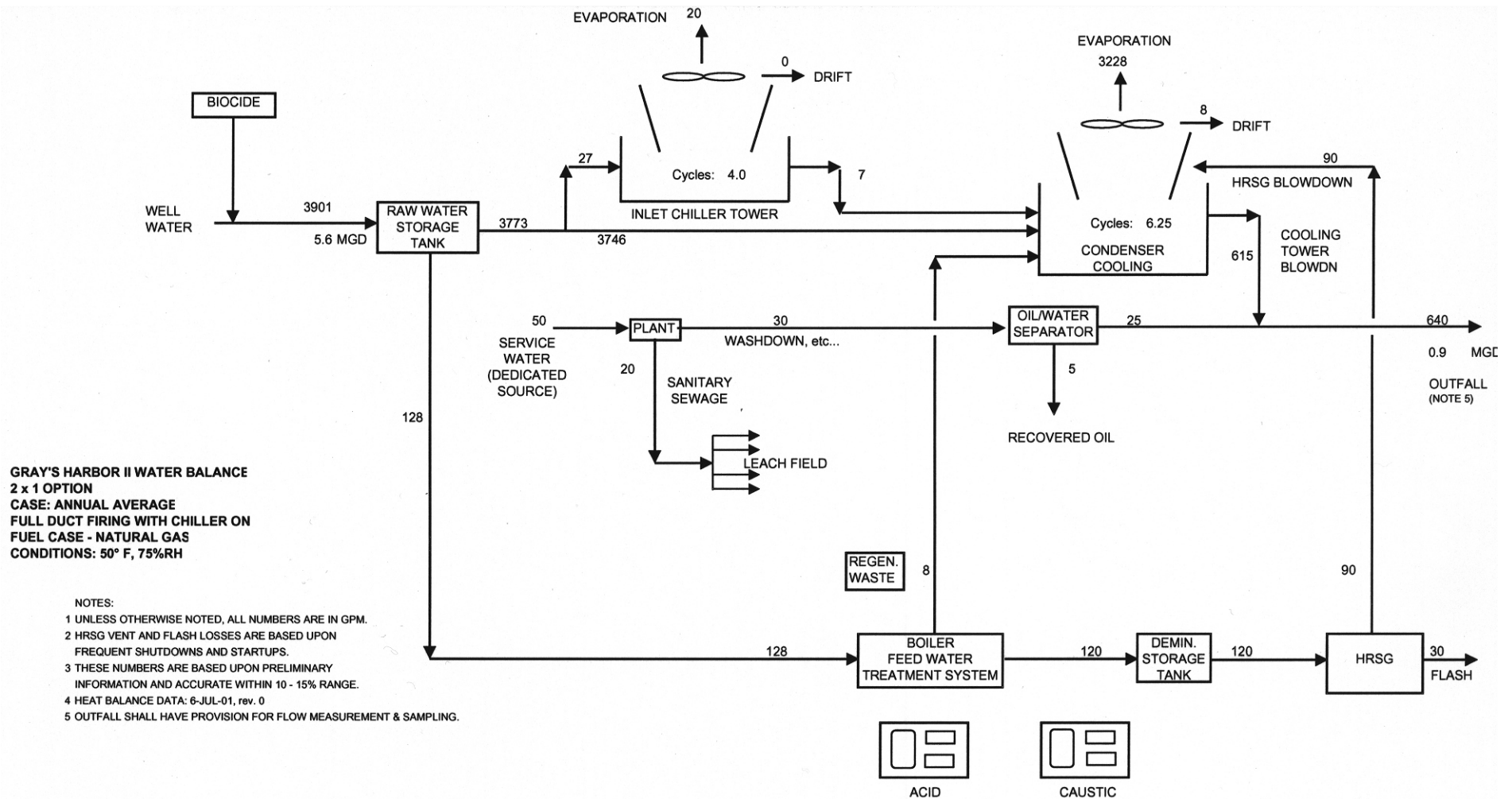


Figure 2.8-4  
**Process Water Average Annual**

Source: Duke/Fluor Daniel